

WHAT IS CLAIMED IS:

1. A photomask for KrF excimer laser lithography having a shade film comprises a photosensitive polymer layer formed in a desired pattern on a quartz glass substrate,  
5 wherein the transmittance of the KrF excimer laser beam by the shade film is 1% or less.
2. The photomask as defined in claim 1, wherein the transmittance of the KrF excimer laser beam by the shade film is 0.5% or less.
- 10 (3) 3. A photomask for KrF excimer laser lithography having an attenuator comprises a photosensitive polymer layer formed in a desired pattern on a quartz glass substrate, and the transmittance of the KrF excimer laser beam by the attenuator ranges from 2% to 16%.
- 15 4. The photomask as defined in claim 3, wherein the transmittance of the KrF excimer laser beam by the attenuator ranges from 4% to 9%.
5. The photomask as defined in claim 1, having a phase shifter for shifting a phase of the KrF excimer laser beam in a predetermined pattern by 180° on the quartz  
20 glass substrate.
6. A method for manufacturing a photomask with a transmittance of a KrF excimer laser beam by a shade film on a quartz glass substrate being 1% or less,

comprising:

- forming a photosensitive polymer layer on the quartz glass substrate;
- irradiating the KrF excimer laser beam or an electron beam at a wavelength
- providing 40% or more of transmittance through the polymer layer; and
- 5        processing the irradiated polymer layer to render a desired pattern.

7.        The method for manufacturing a photomask as defined in claim 6, wherein the transmittance of the KrF excimer laser beam or the electron beam by the shade film is 0.5% or less.

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8.        A method for manufacturing a half tone photomask for KrF excimer laser lithography, wherein an attenuator on a quartz glass substrate having a transmittance of a KrF excimer laser beam ranging from 2% to 16% is formed by

- forming a photosensitive polymer layer on the quartz glass substrate,
- 15        irradiating a KrF excimer laser or an electron beam at a wavelength providing 40% or more of transmittance through the polymer layer or, and
- processing the irradiated polymer layer to vender a desired pattern.

9.        The method for manufacturing a photomask as defined in claim 8, wherein the transmittance of the KrF excimer laser or the electron beam by the attenuator ranges from 4% to 9%.

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10.       The method for manufacturing a photomask for KrF excimer laser lithography

as defined in claim 6, further comprising a step of forming a phase shifter for shifting a phase of the KrF excimer laser beam in a predetermined pattern by 180° on the quartz glass substrate

5 11. The photomask according to claim 1, wherein the photosensitive polymer layer contains absorbent for KrF excimer laser.

10 12. The photomask according to claim 11, wherein the light absorbent is chemically bonded to composition of the photosensitive polymer layer.

13. The photomask according to claim 3, wherein the photosensitive polymer layer contains absorbent for KrF excimer laser.

15 14. The photomask according to claim 13, wherein the light absorbent is chemically bonded to composition of the photosensitive polymer layer.

15. The method for manufacturing a photomask according to claim 6, wherein the photosensitive polymer layer contains absorbent for KrF excimer laser.

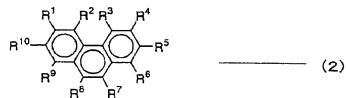
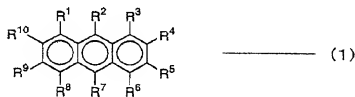
20 16. The method for manufacturing a photomask according to claim 15, wherein the light absorbent is chemically bonded to composition of the photosensitive polymer layer.

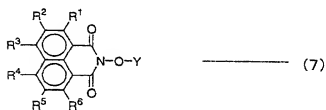
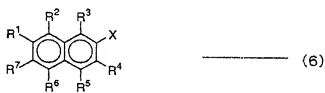
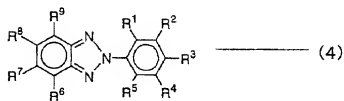
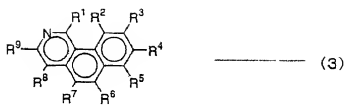
17. The method for manufacturing a photomask according to claim 8, wherein the photosensitive polymer layer contains absorbent for KrF excimer laser.

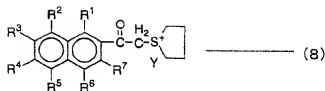
18. The method for manufacturing a photomask according to claim 17, wherein the light absorbent is chemically bonded to composition of the photosensitive polymer layer.

19. A photosensitive resin composition for manufacturing a photomask for KrF excimer laser lithography having a shade film comprises a photosensitive polymer layer formed in a desired pattern on a quartz glass substrate and having a transmittance of a KrF excimer laser beam by the shade film being 1% or less, wherein

the composition containing at least one of light absorbents represented by the following general formulae (1) - (8):







- where R<sup>1</sup> to R<sup>10</sup> each represents an atom or atom group selected from the group consisting of hydrogen, a substituted or non-substituted alkyl group of 1 to 4 carbon atoms, halogen, a hydroxy group, a methylol group, a substituted or non-substituted alkoxy group of 1 to 4 carbon atoms, a hydroxyl group, a phenyl group, a methoxy group, an ethoxyethyl group, a cyclopropyl group, an acetal group and an acetyl group, R<sup>1</sup> to R<sup>10</sup> being identical to or different from each other, X represents a halogenated acetyl group, and Y represents an atom or atom group selected from the group consisting of camphor sulfonate, trifluoro sulfonate and methane sulfonate.

20. The photosensitive resin composition as defined in claim 19, wherein the transmittance of the KrF excimer laser beam by the shade film is 0.5% or less.